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Colorado Plant Materials

LONG RANGE PLAN



U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



DENVER, COLORADO

AUGUST 1977

USDA-SCS-PORTLAND, OR 1977

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Foreword

This Long Range Plan describes objectives and provides guidelines for plant materials work in Colorado. The long range program gives direction to project work at the Upper Colorado Environmental Plant Center and the Los Lunas Plant Materials Center in relation to the needs of Colorado. As a part of the coordinated program of soil and water conservation, the Soil Conservation Service provides specialized assistance in plant materials. SCS authority, policy and procedures for conducting plant materials activities is described in the National Plant Materials Handbook USDA SOIL CONSERVATION SERVICE June 1977.

Plant materials objectives in this plan are also used to assist Soil Conservation Districts in meeting their long range plant materials needs. The needs and objectives expressed herein reflect the knowledge and experience available from Soil Conservation Service field personnel and state plant science staff.


Plant materials needs are grouped into seven categories:

- (1) High Altitude Revegetation, (2) Critical Area Stabilization,
- (3) Range Seedings, (4) Forage Improvement, (5) Beautification and Windbreaks , (6) Intensive Use Areas, and (7) Wildlife Improvement.

Our Long Range Plant Materials Program will be reviewed annually and updated by the State Plant Materials Committee.

The newly established Upper Colorado Environmental Plant Center at Meeker will accelerate development of adapted plants and techniques for reclaiming and revegetating critical lands in the Upper Colorado Basin.

Cooperation of many agencies and private companies has contributed to the rapid establishment and operation of this facility. The advisory committee of cooperators has established priorities and will review project work at the Environmental Plant Center. The Soil Conservation Service's procedure (to assemble, evaluate, release and distribute for commercial production) will be applied to improve plants for resource conservation and development.



Robert G. Halstead
State Conservationist

High Altitude Revegetation

A comparatively new kind of plant materials challenge has entered the picture in Colorado in recent years. This is revegetation at high elevations.

Heretofore, little attention has been given to the problems related to suitable plants for revegetation of extremely "harsh" sites of alpine and subalpine areas. A limited number of plant materials have been developed and have proven successful for subalpine areas. Aside from grasses for hay and forage, few other kinds of plants have been developed. Most efforts to establish hay and pasture grasses have been on sites where the environment is favorable for establishment. Where slopes are steep, soils are shallow, exposure is drouthy and frost-free days are few, the problem of revegetation is acute. When objectives for erosion control, beautification and wildlife are added to the considerations, tied in with plant materials for high altitude revegetation, the overall difficulties become highly complex.

Highways, roads, ski areas, campgrounds, pipelines, overgrazed rangelands, mining, transmission lines, reservoirs, and logging are types of disturbances with urgent need for effective revegetation. Problems become especially serious when areas are denuded that are in critical watersheds above cities, towns or recreation areas.

The collection, development and use of adapted grasses, forbs, and shrubs for high altitude revegetation and knowledge of practical techniques for their establishment are highly important conservation needs.



Critical Area Stabilization

Critical areas can be defined as highly erodible or severely eroded areas, such as dams, mine spoils, cuts, fills, surfaced mined areas, denuded lands, and gullied areas where vegetation is difficult to establish with conventional seeding or planting methods.

Critical areas exist on about one-and-one-half million acres in Colorado today and stabilization is a major need on all types of land use. The extent of the problem will grow rapidly as development of energy resources increase. Land subdivision will also increase the size and significance of the problem.

Problems related to critical area stabilization are related to several major contributors. These include mining, roadside and railroad construction sites, gully erosion, wind erosion, urban, residential-commercial and industrial waste disposal, pipeline and utility corridors, and stream-bank and shoreline erosion.

There are 25,000 square miles of oil shale lands of which 17,000 square miles may be developed.

Mine tailings, mine spoil and gravel pit rehabilitation and revegetation are presently major problems on about 12,000 acres. There are extensive areas of coal bearing land in western Colorado. With the need for fossil fuel, this resource will be rapidly developed.



Mine spoil revegetation problems may be divided into two types.

First, areas of disturbed overburden resulting from strip and open pit mining operations normally present problems of low fertility and poor soil characteristics. In these cases, species with low fertility requirements and/or nitrogen fixing capabilities are needed. These plants should be able to establish rapidly and provide good ground cover. The established vegetation should contain plants desired for future land use and productivity.

A second type of critical area problem associated with mining is rehabilitation of tailings and spent materials. These materials often contain additives which greatly inhibit plant growth. In addition to inherent low fertility and other adverse soil characteristics, plant species used on tailings must be tolerant of additives or changes caused during processing. Improved species, seeding methods, cultural treatment and management of plants are needed on spent material.

Roadside and railroad rights-of-way stabilization is an important problem in all resource areas of the state. The present extent of the problem is about 720,000 acres.

Grasses, trees, shrubs for roadsides and railroads should have low fertility requirements and/or be able to fix their own fertility. In addition, they should be able to establish rapidly, be good soil stabilizers, meet highway safety requirements, and, in big game areas, have low wildlife preference. Although several kinds of plants are now available for some areas, suitable selections are lacking for the drier and higher elevation resource areas.

Seeding methods, cultural treatments and management procedures are known for many conditions. There is a need to test these in different locations and alter them as needed.

Frequently, temporary stabilization of disturbed areas is needed until permanent vegetation can be established. Cultural treatment and necessary management practices must be determined for this purpose.

Construction site stabilization, including dams, water control structures, etc., is an important problem in all the state's resource areas. It involves about 3,200 acres. Although the need for this stabilization will grow slowly, its importance in reduction of pollution will remain high.

Plants for construction site revegetation will require the ability to survive with low fertility, be aggressive spreaders, good soil stabilizers and have low maintenance requirements. In many cases where livestock have access to the structures, plants with low grazing preference would be desirable.

Although seeding methods, cultural treatment, and management are known for many conditions, additional testing and methods should be developed as the need arises. Often, structure design changes would insure a better seeding success.

Gully erosion is a major problem in many areas of the state. This usually is most evident on rangeland and urban and residentially built-up areas. The most extensive gullies occur in resource areas that have low precipitation but receive high intensity storms of short duration. About 500,000 acres are affected.

Major problems involved in water erosion stabilization are plant species selections, establishment techniques, and management following treatment. Grasses, shrubs and trees which can be established quickly, withstand silting, and are aggressive spreaders are needed. In many cases, they should be of low grazing preference.

Methods of establishing effective plant cover in gullied areas are problems in need of additional study. Because of the high water erosion hazard, an economical and highly successful establishment method for various climatic conditions needs to be developed.





Wind erosion is a serious problem on critical areas and sandy rangeland of eastern Colorado. This problem exists on about 17,000 acres.

Blowouts occur mainly in areas of excessive livestock use such as around water, salting areas, and other places where livestock congregate. Many plant materials are available for seeding these areas. However, if more hardy species can be developed, it would be desirable. There is need for more economical methods of seeding blowouts.

Urban fringe, residential, commercial and industrial sites exist in most areas of rapid development. Areas denuded for construction of new buildings, streets, parking lots, etc., are involved. Development of new subdivisions is becoming a major contributor to this problem. For this reason, the largest areas of concern are located along the front range of the mountains and west. Presently, some 200,000 acres are placed in this classification.

In most cases, planting techniques are known, but, temporary stabilization methods and effective and adapted plants are, to a large degree, lacking. Temporary stabilization methods are often needed to control erosion until the proper time for establishing permanent vegetation.

Suitable plants for stabilization and beautification of urban, residential, commercial and industrial sites vary depending on existing conditions. In rural subdivisions grasses, trees, and shrubs that require low maintenance are fast establishing, and tolerant of people and animals are needed.

In urban areas, plants tolerant of air pollution from automobile exhaust and industrial gasses are needed. They should have capabilities of reducing heat, light, noise, and other disturbing factors. Often plants used for urban sites must be able to withstand certain chemicals which enter the soil and water. For example, salt and oil occur in water flowing from streets. Spilled and dumped materials are a factor on many commercial and industrial sites.

Airports and special use areas have two primary needs for plant materials: stabilization of adjacent areas with ground cover and screening undesirable noise and sights from residential areas.

Plants used for the stabilization of areas adjacent to runways must form a dense, low growing cover that produces little residue. The cover must be able to tolerate intense blasts of hot exhaust fumes from airplanes and chemical runoff from the runway. This cover should have low maintenance and water requirements. It should also have low wild-life preference.

Plants, especially vines and other woody species used for screening of runway areas, should be able to effectively screen sound, light, and pollution. These plants should be selected with beautification in mind.

Waste disposal sites are a statewide problem on urban, industrial and rural land. Although the acreage is relatively small, about 14,000 acres, the pollution hazard is great. The problem includes waste from city sewer systems, livestock feedlots, manufacturing and processing plants, and city dumping grounds. The area used to dispose of wastes is rapidly growing as population increases, disposable products become more common, and feedlots develop.

Plants adapted to excessive fertility rates, especially nitrogen and trace elements, are needed. Plants capable of using excessive nitrates to reduce leaching and other problems should be developed. For other situations, grasses, shrubs, trees and other plants adapted to low fertility soils of solid waste dumps, tolerant of industrial chemicals, and able to grow with little water and low maintenance are desperately needed.

Seeding methods on waste sites require additional study. In many cases, such as in solid waste disposal areas, procedures are known. In others, such as on sewer sludge dumps, improved techniques are needed.

Transmission sites present several soil stabilization problems. These critical areas are common to all resource areas, but are most important on rangeland in areas of oil and gas production. The growth of this problem is not expected to be as great as that for other critical sites.

Grasses, trees, shrubs, and other plants are vitally needed for seeding in the drier resource areas on the western slope.

Where livestock are not excluded from newly seeded utility rights-of-way, plants with low grazing preference are needed.

Streambank and shoreline stabilization is important for improvement of fish habitat as well as protection of the surrounding land. This problem will remain constant.

Development of herbaceous and woody plants, which are tolerant to high water tables, silting and unstable soils is needed.

Proven planting methods for streambank and shoreline stabilization are lacking.



Grasses, Forbs and Shrubs for Range Seeding

The plant materials program for rangeland used for grazing livestock and related uses has been a long time need and continues to expand in the state.

Of prime concern is seeding grasses, forbs, and shrubs which are members of the natural plant community of the range sites involved. Desirable features of such plants are palatability, productivity, long life, resistance to grazing and ecological adaptation. Other kinds of plant materials needs on rangeland are covered in sections on Critical Areas, Forage Production on Pasture and Haylands, and Wildlife.

Good breakthroughs have been made in developing grasses for many range sites in the state. Especially outstanding plants, such as "Vaughn" side oats grama, "Lovington" blue grama, "Elida" sand bluestem, "Llano" Indiangrass, "Arriba" western wheatgrass, "Paloma" Indian ricegrass, "Luna" pubescent wheatgrass, "Jose" tall wheatgrass, are examples of what a long-range plant materials plan must produce if progress is to be made in reaching needed solutions in rangeland restoration. Productive forage as produced by the above-named grasses is an urgent need on rangeland in many parts of Colorado.

Plants for soil conservation and forage production on rangeland center around four categories:

- 1) Seeding abandoned cropland (including formerly irrigated cropland) and cropland which should be converted to range cover in areas where climate and soils impose harsh limitations against getting stands established.
- 2) Rangeland in poor condition which must be reseeded in order to reach a condition of fair or better forage production within a reasonable period.

The acreage of this kind of land in the state is estimated to be 800,000. Located in low rainfall zones where either wind or water erosion hazards are high, where saline-alkaline conditions exist, or other adverse environmental factors prevail, the nature of the problem includes these considerations:

Collecting, testing, increasing and finally making needed and desirable grasses, forbs, and shrubs available in the above areas. Specific examples of species are Arizona fescue for South Park; blue gramas for the Upper Arkansas Valley Rolling Plains and the San Luis Valley; Indian ricegrass, squirreltail, budsage, Douglas rabbitbrush, winterfat, basin wildrye and others in the salt-desert regions; muttongrass, western wheatgrass, Indian ricegrass in the eroding bean croplands of the San Juan Basin.

Development of techniques or range seeding is needed to overcome or mollify problems connected with erosion, drought, and soil factors in the above areas.

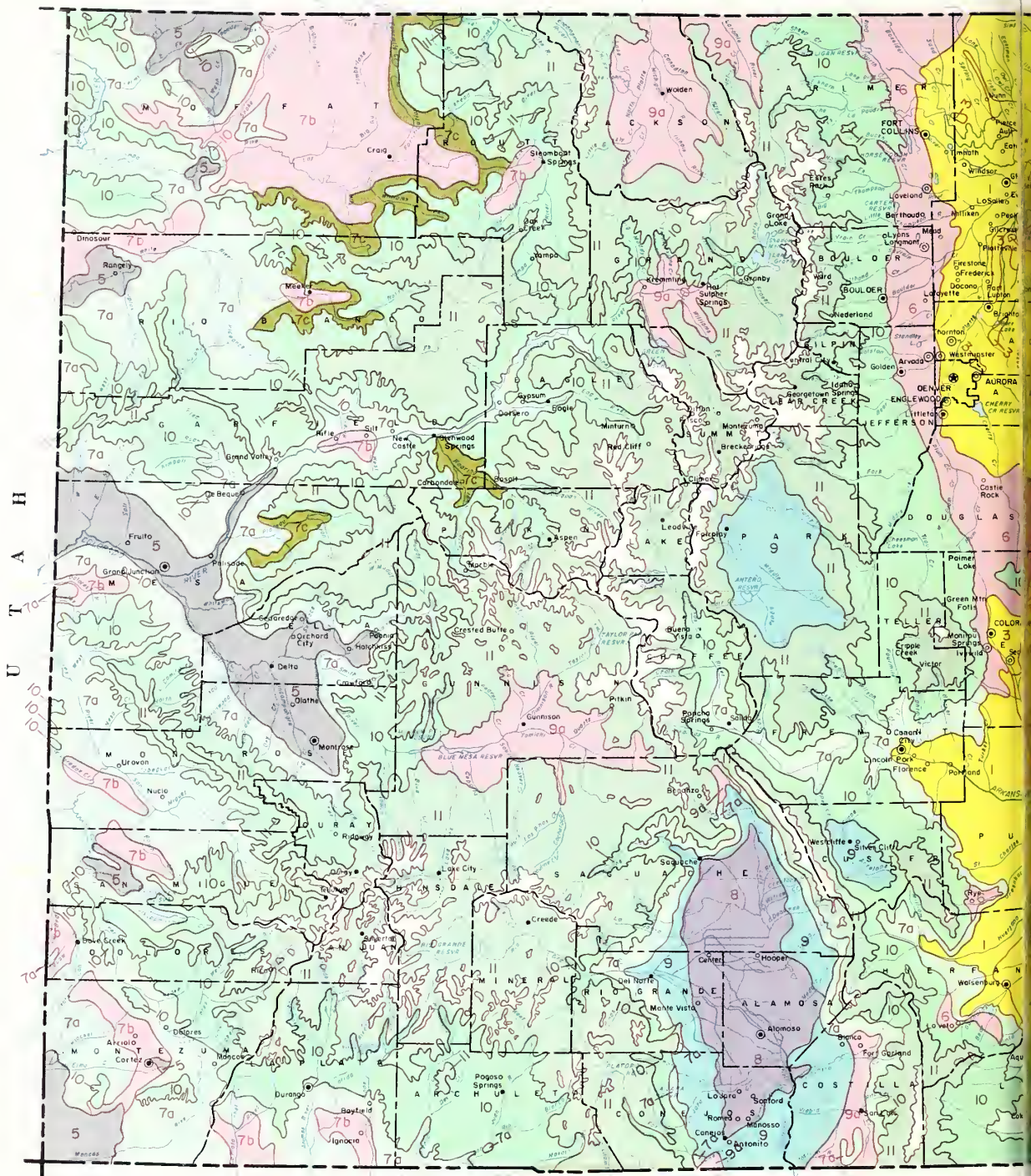
Included is the need for learning the most satisfactory seeding dates for successful establishment.



- 3) Improvement of the quantity and quality of forage produced on range sites having dense stands of pinyon and juniper or Gambel oak is urgently needed to effectively treat five million acres in Colorado. Most of the acreage must be seeded after being cleared. Seeding techniques and methods of establishment are other subjects which the long range plant materials plan must include. Methods of brush removal from seedbeds, (including burning), seedbed smoothing and packing, and other questions need to be resolved. High costs of clearing and seedbed preparation have done much to limit the application of this much needed practice.

A need for expansion of range seeding mixtures beyond the traditional "forage for livestock" to include desirable and adapted browse and forb species for big game animals applies to many Colorado sites. This need is in keeping with the multi-use concept wherein wildlife is an important user of rangeland. Stands resulting from mixtures of grass, browse and forbs will provide a more balanced diet for more animal species, and in many instances will improve the aesthetics of the range.

- 4) Another need is determining how to improve vegetation on low-producing Salt Meadow sites having thick salt grass cover. This is a need on over 100,000 acres along the Platte and Arkansas Rivers. Only a few range species are generally available commercially for these kinds of seedings. The most suitable and effective methods of seedbed preparation, however, have not been fully determined. Heavy sod and continuing competition from the growth of saltgrass greatly hampers needed improvement of these sites by reseeding. An estimated 112,000 acres along the Platte and Arkansas Rivers could be greatly improved by changing the present cover to native grasses such as switchgrass or alkali sacaton.



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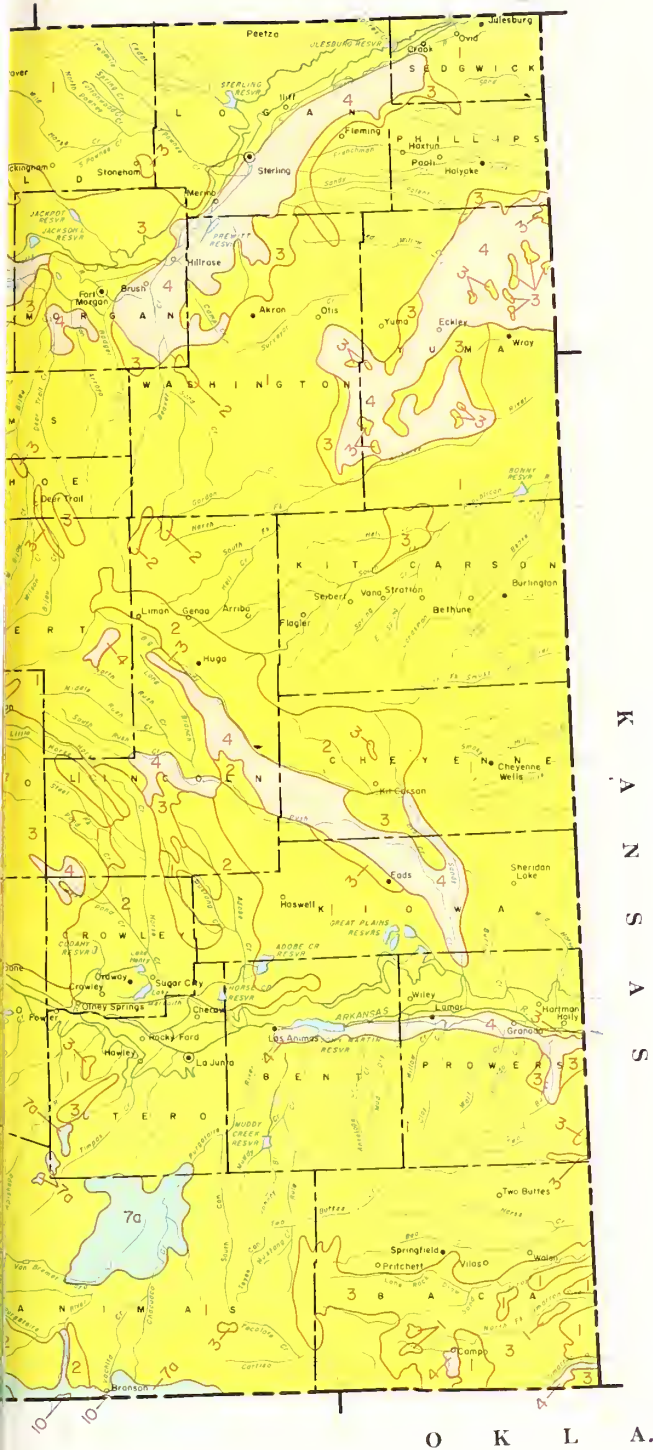


Source:

Base map prepared by SCS, WTSC Carta Unit from USGS 1:1,000,000 Nat. Atlas.

Thematic detail compiled by state staff.

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- 1** GRASSLANDS OF THE PLAINS - Blue grama is the dominant grass.
- 2** GRASSLANDS OF THE PLAINS - Western wheatgrass, galleta, alkali sacaton, four-wing saltbush occur with blue grama.
- 3** GRASSLANDS OF THE PLAINS - Blue grama, sand drupeed, three-awn, sand reed, bluestem, side-oats grama and yucca.
- 4** GRASSLANDS OF THE PLAINS - Sand reed, bluestem, sand drupeed and sand sage on sandhills.
- 5** SHRUBLANDS OF THE SALTDERTS - Saltbushes, rabbitbrush, galleta, Indian rice and greasewood.
- 6** GRASSLANDS OF THE FOOTHILLS - Wheatgrass, needlegrass, sand reed, bluestem and blue grama mixed with areas of shrubs and occasional ponderosa pine.
- 7a** WOODLANDS OF THE INTERMOUNTAINS - Pinyon and/or juniper with wheatgrass, Indian rice, bluegrass mixed with shrubs and forbs.
- 7b** SAGEBRUSH LANDS OF THE INTERMOUNTAINS - Big sagebrush, rabbitbrush, wheatgrass, bluegrass, needlegrass and Indian rice mixed with forbs.
- 7c** OAKBRUSH LANDS OF THE INTERMOUNTAINS - Gambel oak, serviceberry, mountain mahogany, chokecherry in association with wheatgrass, brome-grass, bluegrass and forbs.
- 8** BRUSHLANDS OF THE SAN LUIS VALLEY - Greasewood, rabbitbrush, four-wing saltbush, saltgrass, alkali sacaton, wheatgrass, sedges and rushes.
- 9** GRASSLANDS OF THE HIGH MTN. PARKS & VALLEYS - The vegetation varies from unbroken expanses of grass to scattered pinyon and/or juniper to areas of big sagebrush, rabbitbrush or winterfat.
- 9a** SAGEBRUSH LANDS OF MTN. PARKS & BASINS - Big sagebrush, rabbitbrush, wheatgrass, needlegrass and bluegrass.
- 10** WOODLANDS OF THE LOWER MOUNTAINS - With stands of ponderosa pine (and often Gambel oak) with Douglas fir, blue spruce, white fir and occasional aspen mixed with fescue, muhly, bluegrass, shrubs and forbs.
- 11** WOODLANDS AND GRASSLANDS OF SUB-ALPINE AREAS - With stands of spruce and fir or lodgepole pine, or aspen. Thurber's fescue grassland parks intermingle with timbered areas.
- 12** GRASSLANDS AND MEADOWS OF ALPINE REGIONS ABOVE TIMBERLINE - With sedges, grass, willow, birch and numerous forbs.

NATURAL VEGETATION

COLORADO

OCTOBER 1972

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Grasses and Legumes for Forage Improvement

The problems and needs related to forage production continue to grow more complex. Commercial fertilizer is more expensive; water for irrigation is more expensive; livestock markets continue to be erratic. These are some of the basic problems related to forage production. The management of forage crops has to be tailored to meet the needs of the specific plants. Plants adapted to supplemental irrigation and lower levels of fertility are needed. Improved cool-season grasses to furnish spring and fall grazing are badly needed to relieve pressure on native range and furnish forage before and after wheat grazing is available. Combinations of plants to furnish high quality year-round grazing is needed throughout the state.

More plant species with nitrogen fixing ability are needed. Additional information is needed statewide on amounts of nitrogen fixed by existing species of legumes. Improved species of alfalfa and clover for high elevation plantings are needed.

Species and better methods are needed to establish vegetation on saline-alkali soils, wetlands, eroded lands, and other problem areas statewide. Additional research is needed on methods of establishing grasses and legumes. The effects of chemical weed control vs. mechanical weed control is needed.



Trees and Shrubs for Windbreaks and Environmental Plantings

The national quest for environmental improvement and energy savings have placed greater emphasis for improved trees and shrubs.

It is a proven fact that effective windbreaks can substantially reduce heating costs, increase livestock gains, reduce noise levels, and reduce soil loss while saving precious moisture. The above reasons dictate that considerable attention be placed in developing a list of species for use in Colorado.

There is an urgent need to find a replacement of Siberian elm that would have a longer life span.

More disease and insect resistant varieties of woody plants must be selected.

There is an urgent need for species better adapted to low precipitation areas and water requirements. Minimum irrigation requirements need to be determined for many woody species.

Adapted attractive trees and shrubs with low maintenance requirements are needed for screening purposes, landscaping, and recreational use.

Adapted ornamentals which are attractive, but unpalatable to wildlife, will fill a need for use in outlying developing areas.

Effective plants for screening public service facilities against sound, heat, light and chemical dispersion will play an important role in improving environmental quality.

Planting guides and lists of adapted plants for use by landscape architects, planners and consultants for use in outlying development areas are requested by a growing number of individuals and groups each year.

Woody plants to screen and beautify transportation route and similar areas that are resistant to effects of salt from deicing highways, air pollution from traffic, heat reflected from road surface needs to be developed and put to use.



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Food and Cover for Wildlife

Wildlife areas include those used by big game, small game, waterfowl, various non-game species, and fish. Plant needs are essentially those to provide wildlife food and cover.

There is a general need to provide and/or improve wildlife habitat in all portions of Colorado.

Wildlife often receive a "spinoff" from plants developed for another use. Wildlife utilize many plants seeded for other purposes, i.e. grazing, forage, erosion control, etc. Development of plants for use on deer winter range, along with the attendant establishment techniques and improving availability of seed or planting stock, is the most critical wildlife problem in Colorado. There is a continual decrease in available deer winter range due to road construction, subdivisions, various recreation uses including ski areas, and a host of other competing land uses.

Existing winter deer range must be improved to carry the additional burden which is being placed on each acre.

Efforts to improve deer winter range in many cases involve some form of treatment to reduce the often homogeneous big sagebrush cover. After this treatment, grass and browse species should be established. It is highly desirable that two or more browse species be included. This is important. Although big sagebrush is a nutritious winter deer food, a browse mixture should be available to the deer.

It is recognized that big sagebrush is an important big game winter food and efforts should be made to replace the relatively unpalatable varieties with subspecies that are palatable to both livestock and big game animals. Such subspecies as artemisia tridentata vaseyana and A. T. Wyomingensis.





Of perhaps equal importance is the development of pheasant habitat in eastern Colorado. Losses of suitable pheasant habitat continue to occur.

In eastern Colorado, as well as in many irrigated areas, the ring-necked pheasant is an important upland game species. Pheasant numbers have shown a general decline the past few years. Undoubtedly one of the major reasons for this decline is a lack of suitable habitat. Critical habitat needs are for undisturbed nesting cover utilizing adapted grasses and legumes, escape cover using shrubs, and winter cover using both deciduous and coniferous trees and shrubs. There is a need for new plants that can satisfy the habitat needs of the pheasant and that will grow in areas with often highly adverse climatic regimes.



Traffic Resistant Plants for Ground Cover on Intensive Use Areas

These are areas subjected primarily to heavy trampling by people. Typical examples are trailer camps, campgrounds, parks, dryland golf courses, youth camps, ski areas, etc.

The areas occur statewide wherever recreation is significant and are often on sites having unstable soils and fragile native vegetation. Availability of irrigation water is often limited or non-existent on many of these sites.

While it is difficult to estimate the total acreage of these areas, it is obvious that the State is rapidly developing its recreation potential; and the problem of stabilizing these areas is accelerating.

There is a need to develop low growing turf grasses with broad site adaptability that will establish easily, and withstand intensive human traffic. At present, inland saltgrass appears promising. Other grasses with similar characteristics need to be found and tested. Forbs with these characteristics should also be sought.

Testing of inland saltgrass will also require experimentation with sprigging techniques.

Priority Plant Materials Work

Listed below are the high priority plant materials needs in Colorado. SCS plant materials resources will be focused on these needs as part of the Long Range Conservation Program.

- 1) Test and develop plant species for high altitude revegetative work.
- 2) Develop palatable browse plants for big game winter range and devise successful establishment methods.
- 3) Test plants and establishment methods for seeding soils disturbed by energy resource development and associated roadways, utility corridors and pipeline construction.
- 4) Select plants for pheasant habitat improvement in northeastern Colorado.
- 5) Develop plants and establishment methods for seeding processed oil shale.
- 6) Develop traffic resistant turf plants with low water and maintenance requirements for intensive-use areas.
- 7) Develop palatable plants for reseeding rangelands in low rainfall zones (below 11 inches).
- 8) Test plants for roadside stabilization and beautification that are unpalatable to big game species.
- 9) Develop methods for establishing a heterogeneous plant community on reconstituted soils disturbed by coal strip mining and/or resource development.
- 10) Test species and methods for establishing windbreaks (trees and shrubs) in areas receiving less than 12 inches annual precipitation.
- 11) Develop plants for temporary stabilization and cover on urban critical areas and construction sites.

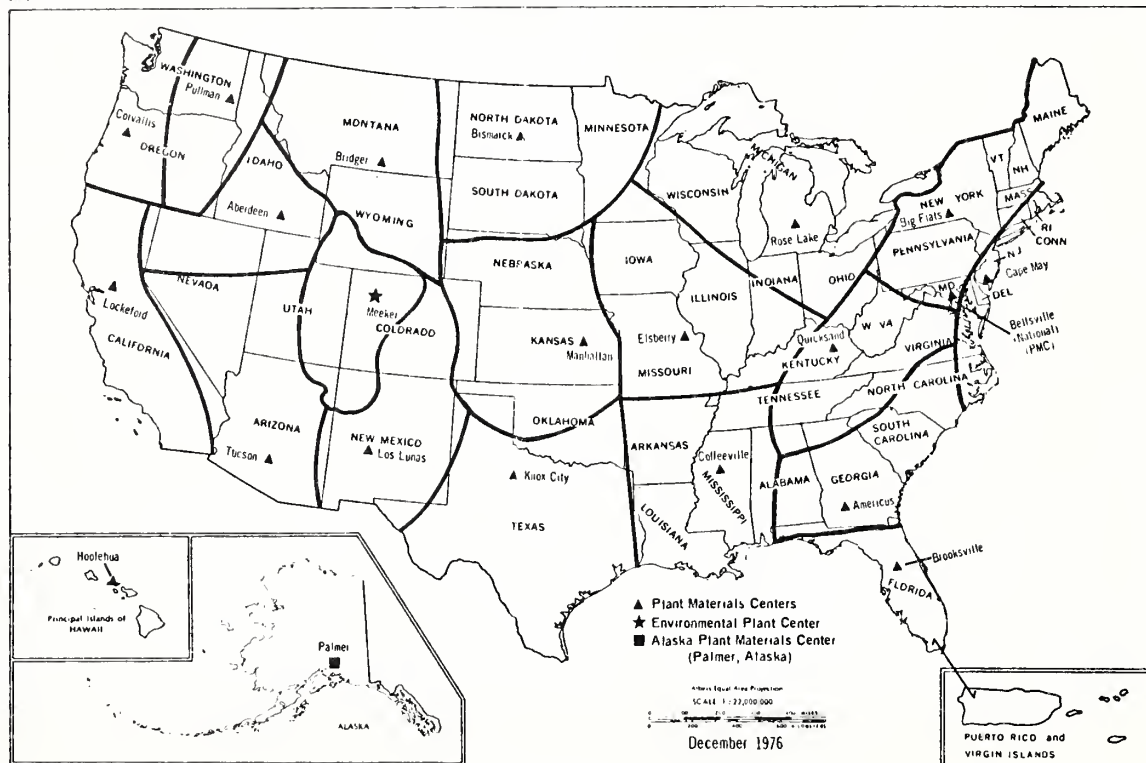
Other Plant Materials Needs

- 1) Develop plants for use around airports.
- 2) Develop native landscape plants having low water requirements.
- 3) Test methods and plant species for sand blowout stabilization.
- 4) Test plants that will withstand effluents from sewage (human and animal) collection systems.
- 5) Develop plants for streambank and shoreline stabilization.
- 6) Develop and/or select plants suitable for use in waterfowl farming.
- 7) Test cool season grasses for early spring forage on warm season grass ranges, especially in southeastern Colorado.

Location and Service Areas of Plant Materials Centers

U. S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE



Colorado is served by three plant materials centers as shown on the map above. The Upper Colorado Environmental Plant Center, established in May 1975, is located at 6300' elevation, with annual precipitation of 16" and a frost free period of 90 days.

The Los Lunas New Mexico Plant Materials Center is located at 4800' elevation with annual precipitation of 8" and average frost free period of 160 days.

Manhattan Kansas Plant Materials Center serving the eastern edge of Colorado is located at 1100' elevation with 32 inches annual precipitation and frost free period of 180 days.



**U. S. D. A.
Soil Conservation Service**



assisting the



**colorado association of
soil conservation districts**

